

195. ALCOHOL.
Mashing-
Processes.

[This Drawing is a reproduction of the Original on a reduced scale.]

(3 SHEETS)
SHEET 1.

17.246 1896 Mashing Processes
Sweet P. 9028-1897

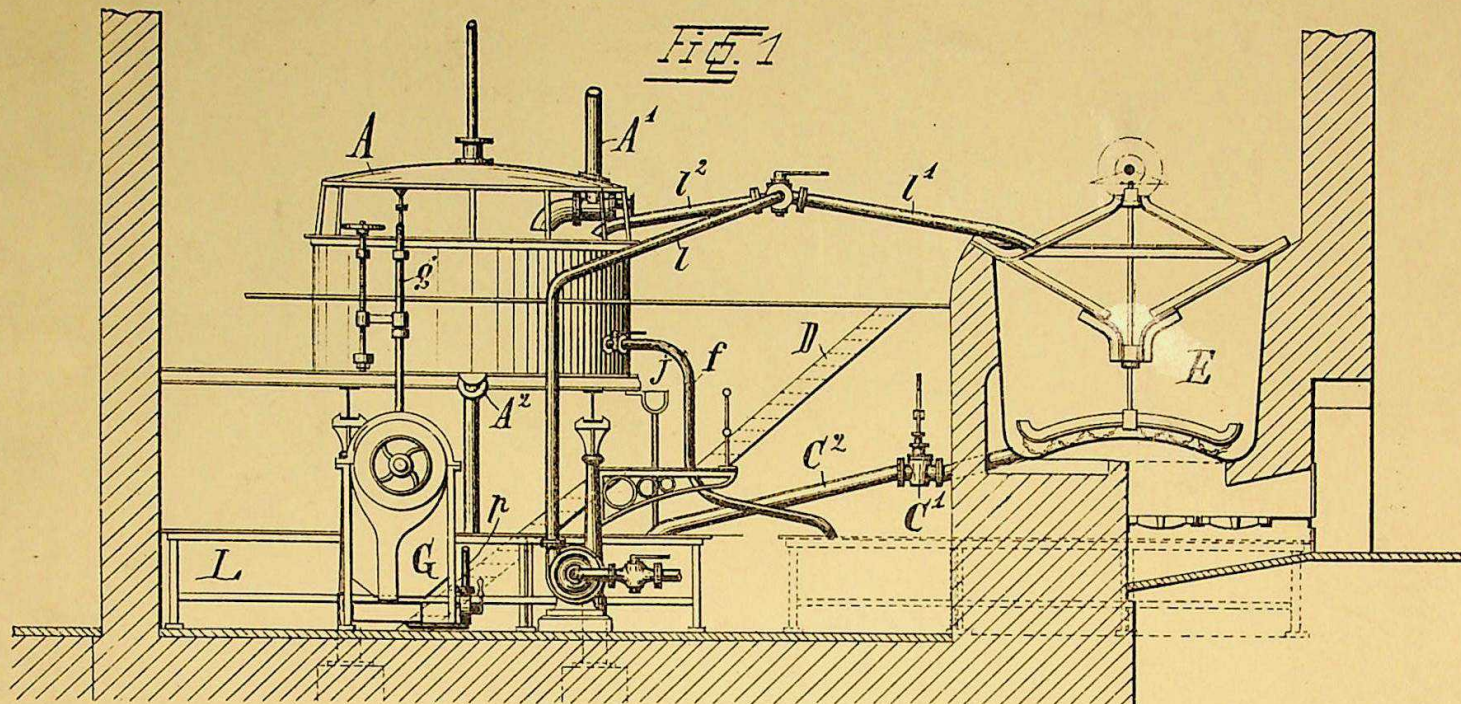
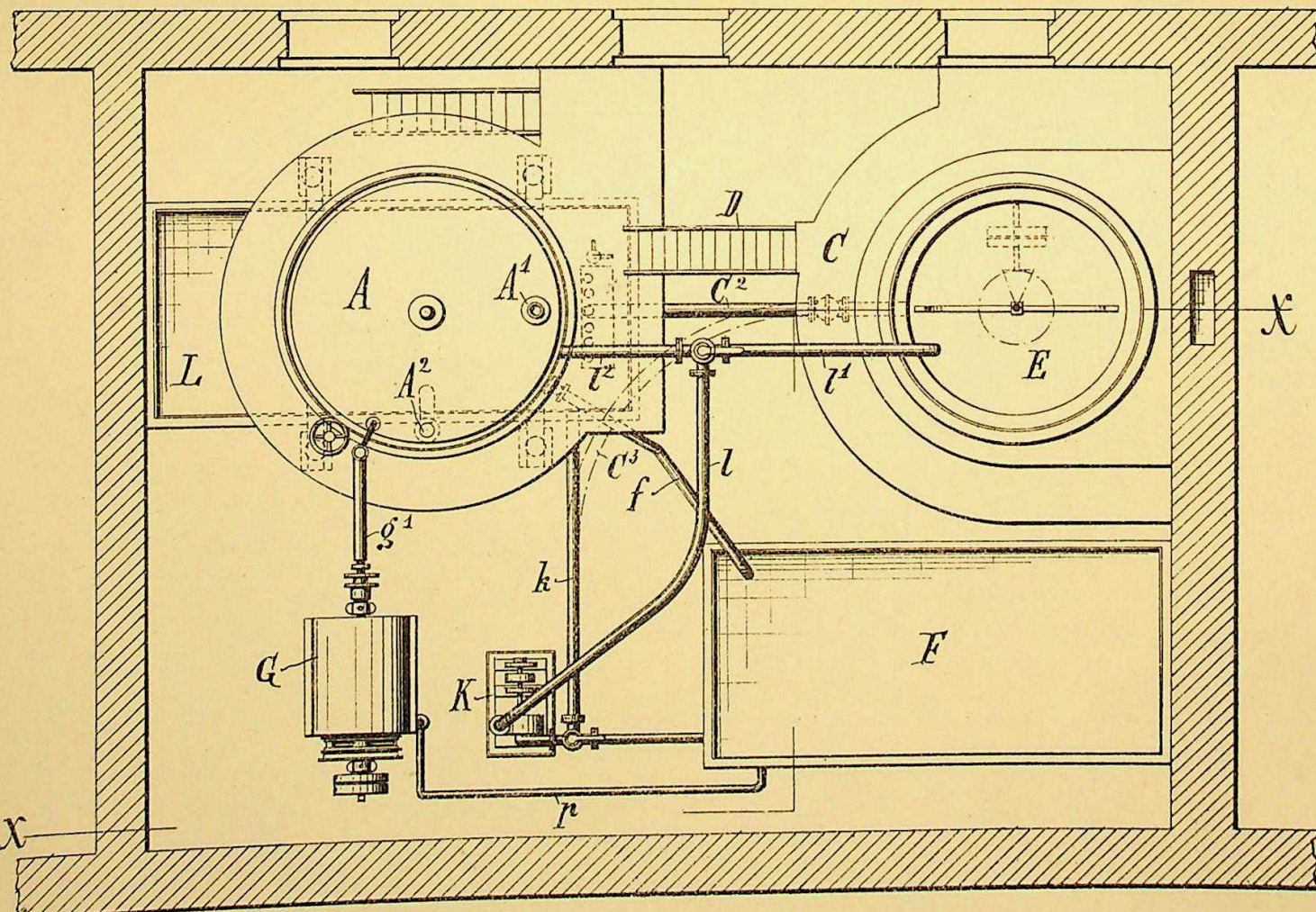


Fig. 2



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London. Printed by Darling and Sons Ltd. 1896.
for Her Majesty's Stationery Office

A.D. 1896. AUG. 4. N°: 17,246.

CHAZKA'S COMPLETE SPECIFICATION.

HOL.
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Purifying

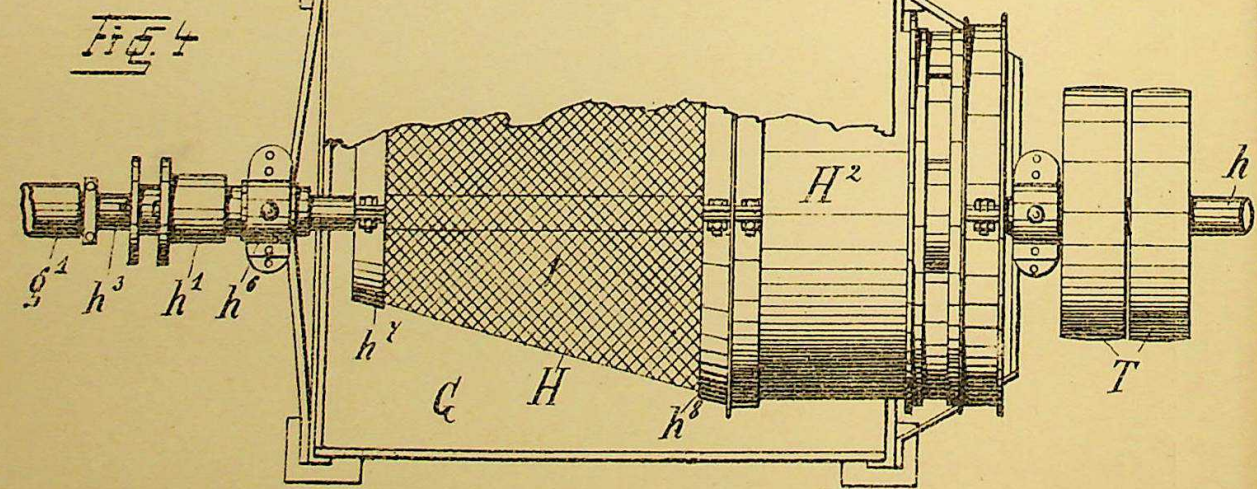
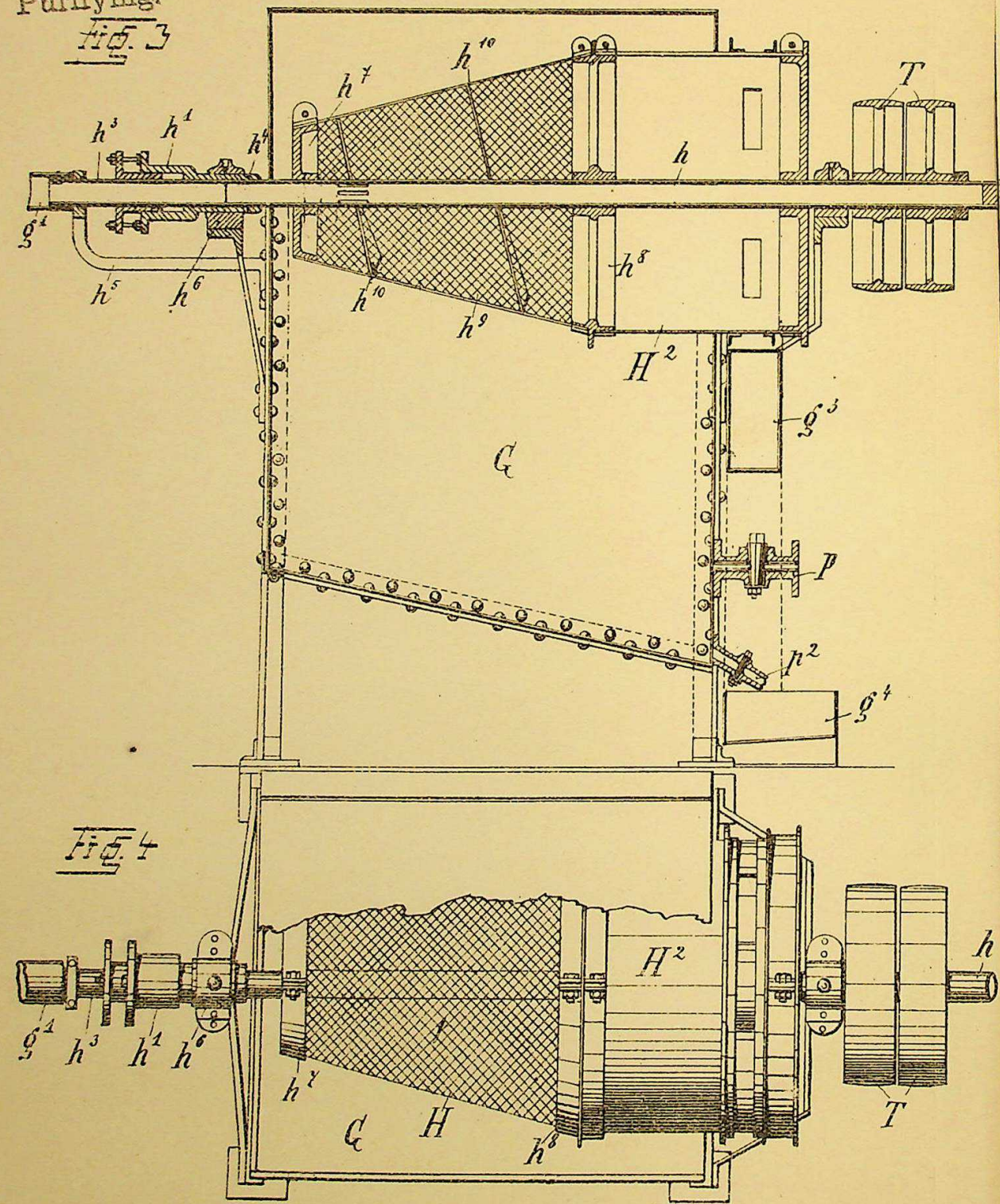
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195
32
ALCOHOL.
Mashing-
Wort.
Purifying.
Fig. 3

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1896



195
32
ALCOHOL.
Mashing-
Wort.
Purifying

(3 SHEETS)
SHEET 2
17246
1896

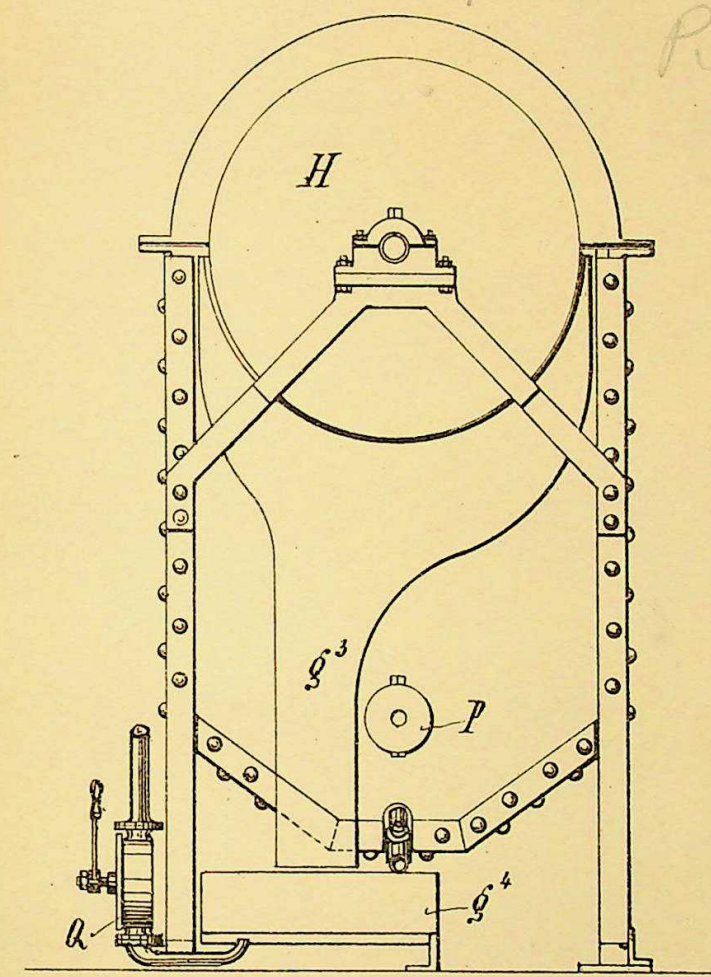


Fig. 5

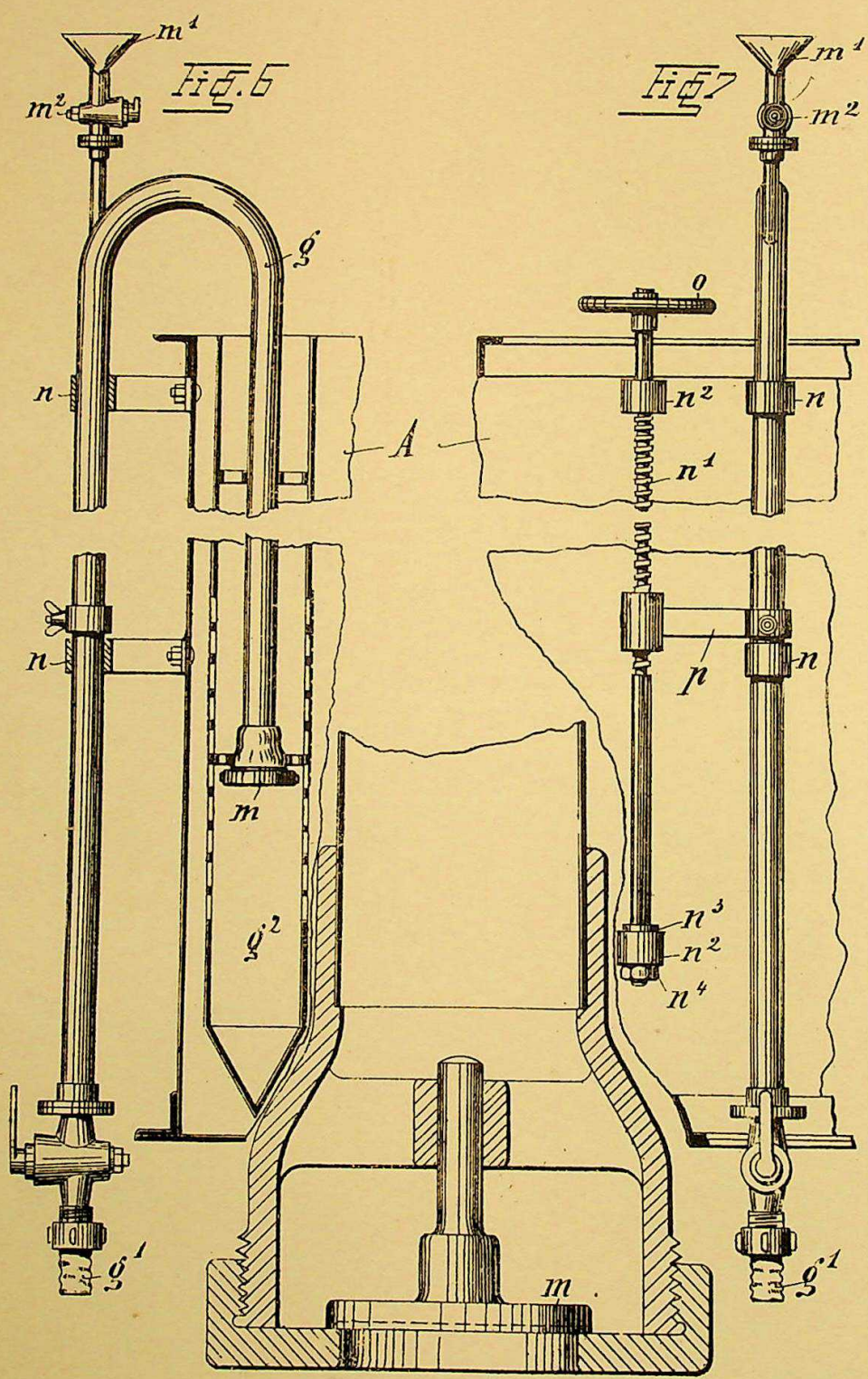
195. ALCOHOL.
Mashing-
Purifying

[This Drawing is a reproduction of the Original on a reduced scale.]

17246, 1896

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A.D. 1896. Aug. 4. N° 17,246.
PROCHÁZKA'S COMPLETE SPECIFICATION.



[This Drawing is a reproduction of the Original on a reduced scale.]

426/11

N° 17,246



A.D. 1896

Date of Application, 4th Aug., 1896—Accepted, 17th Oct., 1896.

COMPLETE SPECIFICATION.

DUPLICATE RECORDED

An Improved Process and Apparatus for Mashing and Brewing.

I LADISLAUS PROCHÁZKA, Brewer, of Turnau, Bohemia in the Empire of Austria, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

5 This process forms an improvement of the mashing and brewing process described in the Specification of the English Patent No. 14919 of 1894 using simultaneously the aerating process shown in the Specification of the English Patent No. 14918 of 1894.

10 The invention relates to the apparatus used for this process as well as to the process itself. Referring to the Patent No. 14919 of 1894 and to the method thereby already made known, the latter shall be considered again hereinafter and described in its present modification.

After the various hitherto usual methods of brewing either by decoction or infusion whether carried out better or worse, there remains a large part of starch and difficultly soluble albumen stuff in the returns, because it is impossible to 15 render them soluble according to the older processes and to bring them into the wort. Also finished beers brewed after the hitherto usual methods often show still a starch reaction which shows that all the starch of the malt has not been made into sugar. It is a fact that if the malt returns sparged after the usual processes are again boiled and mixed with iodine-solution, the returns will still react on 20 unchanged starch. In the process of Patent No. 14919 of 1894 and the present modification, albuminous matters contained in the malt and which have been taken off in the usual brewing methods by coagulation, are changed partly into soluble modification and give to the beer especially good qualities. Besides this also all 25 the starch is converted into sugar so that the returns may be sparged until to the extreme limit. Whilst hitherto, even in the best brewing, the practical product remained 2 to 8 per cent. and more behind the theoretical product; according to the new process there are obtained about 1.8 to 2.5 per cent. and more above the so-called theoretical product, it having been impossible to deduct from the malt 30 more albumen and to sweeten more starch even in the laboratory. The process specified in the Patent No. 14919 of 1894 is changed and improved according to the present modification so that the malt is mashed at a temperature of about 66 degrees C. and so much water is used that 100 kg. malt give a mash quantity of about 4.45 hectolitres. After all the malt is mashed, the mash is left quiet for 35 the purpose of depositing and clearing. The malt extract, rich in diastase is taken out pure and clear as possible from the bruised malt, and placed in a special vessel whilst the remaining thick mash is brought into the mash tun, and then heated very slowly to about 75° C. In this description I shall call this thick mash for purposes of distinction between this and hitherto usual processes, "grains mash" which 40 contains all returns of the whole quantity of mash.

Simultaneously air at 125° C. is blown into this grains mash as shown in Patent No. 14918 of 1894 and by this ventilation is effected the solution or peptonizing of a part of the albuminous matters.

The grains mash is then brought to boiling and boiled 25 to 50 minutes according 45 to whether the malt was good or bad and if lighter or darker beer is required. In the mean-time the malt extract which is rich in diastase and deducted at the beginning

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Chill Proof ?
Peptonizing mash
by aeration, also
adds malt extract
to mash (to convert
starch)

1896

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from the malt, has been lifted again into the mash tun and worked further with the mash machine in order to sweeten completely the remainder of starch, if any, still in the malt extract and on the other hand in order to lower the temperature of the liquid in such a manner (of course not so far as to attain injurious temperature limits) that the grains mash which is now arrived from the mash-tun, ventilated, boiled and rendered soluble, receives together with the malt extract a temperature of about 66 to 70° C. as at the beginning of the mashing. The whole is mashed until the whole starch has disappeared and the starch paste which is contained in the returns and dissolved by the boiling, is sweetened by the diastase of the malt extract.

When the second mashing is finished, the thicker part of the mash is brought into the brewing pan, its temperature is augmented slowly to 88° C. or it is boiled according to the quality of the malt used and the type of the beer to be produced and also aerated a little whereupon the part richer in returns is lifted to the mash tun which at the same time forms the clearing tun.

The now completely exhausted grains offer an excellent filter layer so that the wort will very soon run completely clear. The further operation of the brewing process is the usual one with the exception of the ventilating in the wort pan of the wort mixed with the hops.

In the annexed drawing is shown in Sheet I a brewing installation which has generally the construction usual in the English brewing method, which arrangement can be used very well for the new method the boiling pan being provided with direct grate firing appropriate for the thick mash boiling; if there is a steam boiling pan, a special mash pan with direct firing must be added.

Fig. 1 is an elevation of the brewing installation on line *x—x* of Fig. 2. Fig. 2 is a plan; on Sheets II and III are detail views.

A is the high standing mash tun, E the boiling pan, C is a landing to which leads a staircase D; G is an intermediary vessel for receiving the malt extract taken from the mash tun by means of the syphon *g*; the tube *g* continues into a tube *g*¹ which is connected to the hollow shaft of the conical drum H. The construction of the latter is to be seen from Figs. 3 to 5, Sheet II and its effect will be explained hereinafter. F is the hop-filter. K the centrifugal pump. L the under-back.

The ground malt is brought through the preliminary mashing apparatus A¹ of any construction into the mashing tun A, is mashed therein, and then, after the sweetening is effected, the whole is left quiet. Then the liquid is taken by means of the syphon *g* to the intermediary vessel G. The syphon *g* which is shown on Sheet III in Fig. 6 in side view and in Fig. 7 in front view, is a two legged tube which is provided on the under end of its shorter leg with a foot-valve *m* (Fig. 8), and on the top with a filling funnel *m*¹ with a closure cock *m*² beneath the latter. The longer part is guided in two eyes *n*, *n* fixed on the mash tun and the syphon can be vertically adjusted by a spindle *n*¹ which is carried by the eyes *n*² *n*² equally fixed on the tun and which spindle is held by the collar *n*³ and the screw nut *n*⁴; the spindle provided on the top with a hand wheel *o* is provided in the middle with screw threads round which reaches the arm *p* operating there as female screw and fixed with the other end of the syphon. If therefore the hand wheel is turned the syphon is lowered or lifted and in this manner it can be put slowly into the liquid standing over the bottom layer and the liquid can be drawn off clear. In order to prevent any suction of malt grains the end of the shorter leg is surrounded by a sieve like perforated cylinder *q*² which, closed below by a metal plate cone, is surrounded in its middle part at the height of the malt returns by width of 20 cm. of unperforated fabric so that the pulpy parts of the returns cannot penetrate into the cylinder and that only pure malt extract can be sucked from the returns layer into the perforated cylinder which on lowering the syphon forms a suction basket. The other end of the syphon is connected by a tube *q*¹ with the drum H of the vessel G. The latter shown in Figs. 3 to 5 on Sheet II on a larger scale, consists of a rectangular box with oblique bottom which possesses near the under part a delivery cock P, from which leads a tube *p* to the hops-sifter F; under the cock stands a smaller vessel *q*⁴ into which enters a funnel *q*³ coming from above.

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In the top of the box G is arranged a conical drum H, the hollow shaft *h* of which is connected by the stuffing box *h*¹ with the tube *g*¹ in such a manner that the end of *h* is fixed by means of rivet *h*⁴ in the stuffing box *h*¹ in the bearing *h*⁶. The stuffing box takes therefore part in the revolution of *h* into which, on the other side, is slid the tube piece *h*³ secured in the bar *h*⁵ against rotation, on which tube piece is seated the tube *g*¹. The conical drum H consists of the bottom *h*⁷ and the arm cross *h*⁸ over which is placed a metal sieve *h*⁹ as mantle. In the interior are fixed several screw threads *h*¹⁰ formed by standing plate bands. The latter is closed on the front side, projects over the end of the box G and is surrounded by the already mentioned funnel *g*³; upon the end of the there closed tube shaft *h* is placed a fast and a loose pulley T. When the malt extract is introduced by means of the syphon *g* into the hollow shaft *h* provided with openings and the drum is turned by the pulley T, the liquid flows through the sieve mantle *h*⁹ into the vessel G, whilst accidentally arriving starch grains and returns are removed by the effect of the screw threads *h*¹⁰ into the end part H² where they pass through openings in the circumference of the cylindrical part through the funnel *g*³ into the collecting vessel *g*⁴. When all the liquid has been drawn off it is left quiet in the box G and in the meantime the grains mash remained in the mash tun is taken through the valve A² through the under back L, the pipe *k*, the pump K and the pipe *l*, *l*¹ into the pan E. When the liquid in the vessel G is clear the cock P is opened carefully, the liquid is taken into the hops-sifter F and pumped from there through the centrifugal pump K and the pipe *l*, *l*² into the mash tun A, after the grains mash, as before described has been taken into the pan E. The subsequent raising into the mash tun A, of the grains mash, which has in the meantime been aerated in the pan at a temperature of 75° C. and then boiled, is effected by opening the valve C¹ whereupon the mash flows through the pipe C² into the under back L and is raised from there through the pipe *k* by the pump K by means of the pipes *l*, *l*² into the mash tun. The mixture of malt extract, rich in diastase, and the boiled thick mash now in the mash tun is again mashed and the first thinner half of the mash is passed, after complete sweetening, through the side pipe *f* into the hop-sifter F; the second thicker half is passed through the valve A² into the under back L and raised through the pipe *k*, the pump K and the pipe *l*, *l*¹ into the pan E where the temperature is augmented to 88° C. or brought to the boiling point; then it is again aerated and, by means of a pipe C³, connected in the meantime to the valve C¹, there is effected a connection with the pump K by which this second half of the mash is raised into the tun A which in the meantime has been cleaned and prepared as clearing tun. The first half of the mash preserved in the meantime in the hops-sifter F is now treated in the pan E in the same manner and the mash in the mash-tun, now clearing tun, is taken through outlet J into the under back L, and the first half being in the meantime in pan E is added after the boiling, whereupon the wort is hopped and treated in the usual manner and if desired again aerated. The aerating is effected in the manner shown by the Patent No. 14918 of 1894.

The hand pump Q on the vessel *g*⁴ is intended for raising into the mash pan the starch particles and returns separated by the drum H as well as the deposit taken at cock *p*² out of the vessel G into vessel *g*⁴ at the time when the thick mash is alone in it for the aerating.

By the aerating the gluten is rendered quite harmless even by using glutinous barley, as it is partly coagulated and partly transformed by the peptonizing effect of the aerating into a modification which is not only harmless, but extremely valuable for the beer by which not only the nourishing value, but also the other qualities of the beer are considerably augmented. A thickening of the beer by gluten is completely excluded. As it is known on the standing of beer albumenous matters are deposited very slowly in small flocks, long standing being necessary for the purpose of clearing the beer. These albumenous matters give to the beer the characteristic unpleasantly immature taste; according to the present process the beer cannot become thick because such albumenous matters are no longer present. Beers brewed after this new method are, after three weeks standing, better clearer and of

Procházka's Improved Process and Apparatus for Mashing and Brewing.

more mature taste than beers brewed by the older method in the same brewery with the same malt and standing 2 months.

The treatment with finings, filters *etc.* is therefore avoided, also a brewery working after this method requires only half as large cellar accommodation. The transformation of the albuminous matter into peptones gives great viscosity which hitherto could only be obtained by using very sharply dried malt whilst after the aerating process with quite clear malt dried at 56 to 62° C. a much greater viscosity is obtained than in the hitherto usual process under favourable circumstances.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed I declare that what I claim is:—

1. The mashing and brewing process as set forth under Letters Patent No. 14919 of 1894, modified so that the mash produced at any mashing temperature is left for the clearing and depositing of the bruised malt, the clear malt extract rich in diastase being separated from the bruised malt layer, the grains mash heated by itself alone to 75° C. and then boiled and simultaneously air of about 125° C. temperature blown into the latter for the purpose of peptonizing and thereby dissolving a part of the albuminous matter whereupon the thick mash is again mixed with the liquid rich in diastase and thereby the whole still existing starch sweetened, whereupon the whole mash is boiled and finally drawn off and hopped in the known manner in one or several parts.
2. An apparatus for separating the malt extract from the deposited bruised malt layer after the mashing is effected, consisting of a syphon *a*, the shorter leg of which is surrounded with a strainer *g*² whilst the longer leg is guided in eyes on the outside of the mashing tun and can be lifted or lowered by means of a screw spindle *n*¹ fixed on the side, a screw nut *p* upon the spindle being lengthened to form an arm fixed on the syphon.
3. An apparatus for clearing the malt extract drawn off by the syphon consisting of a vessel *G* with oblique bottom over which is arranged a conical sieve drum *H* with hollow axle *h* and interior screw ribs *h*⁴ to which drum is adjoined on its large end a receiving funnel *g*³ for the impurities taken off, whilst the opposite end of the hollow perforated axle *h* is connected with the syphon *g* by a tube.
4. The filtration of the malt extract rich in diastase for the purpose of avoiding the starch reaction of the wort, aerating with air of 125° C. free from germination for the purpose of the coagulation, removing and changing of the gluten, peptonizing of one part of the albuminous matters and augmentation of the temperature of the whole mash to 80° C. or to boiling in one or several parts.

Dated this 4th day of August 1896.

HERBERT HADDAN & Co.,
18 Buckingham Street, Strand, London, W.C., Agents to Applicant.